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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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FITZPATRICK CELLA HARPER & SCINTO
30 ROCKEFELLER PLAZA
NEW YORK, NY 10112

EXAMINER	
NEWMAN, MICHAEL A	
ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/736,686	CHEN ET AL.	
	Examiner	Art Unit	
	MICHAEL A. NEWMAN	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,5,8,10,11 and 19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5,8,10,11 and 19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 12th, 2008 has been entered.

Response to Amendment

2. The amendment received on November 12th, 2008 has been entered.

3. In view of the amendment to the claims, the amendment of claims 1, 10 and 19 are acknowledged. Claims 3 – 4, 6 – 7, 9, 12 – 18 and 20 have been previously cancelled.

Response to Arguments

4. Applicant's arguments filed on November 12th, 2008 have been fully considered but they are not persuasive.

a. In pages 6 – 9 of the Remarks, regarding the 35 U.S.C. 103 rejection of the independent claims 1, 10 and 19 over Suzuki (U.S. Patent No. 5,859,921), "Suzuki", and Ando (U.S. Patent No. 5,008,946), "Ando"; Applicant's Representative submits that the combination fails to teach the newly added claim

limitations. Specifically, that both Suzuki and Ando only gradually narrow down an area to obtain an eye area, but fail to teach determining a neighborhood region based on an unverified candidate eye area, the neighborhood region being defined as a rectangle centered about the unverified candidate eye area. Applicant's Representative further particularly submits that Suzuki only teaches detecting a candidate eye area based on histograms and then determining an eye area using the width of the candidate eye area and a maximum histogram value, but does not carry out step 'c)' as claimed. The Examiner *respectfully* disagrees. In the previous Office Action it was noted that the term "candidate eye area" was being interpreted as simply an area that could be an eye, and Suzuki taught extracting characteristic feature areas of the face such as eyebrows, eyes, nares, etc. from the binary image, which could all be eyes. The new claim language simply renames the existing term as "unverified candidate eye area"; however, the Examiner submits that the above interpretation still reasonably applies. Furthermore, it was noted that the steps of defining eye searching area, candidate band areas and finally eye candidate areas, corresponded to the step of determining "a region based on the candidate eye area", wherein the eye candidate area in Suzuki corresponds to the region encompassing the candidate eye area. The new claim language recites a "neighborhood region" based on the unverified candidate eye area, the neighborhood region being defined as a rectangle, the center of which is the center of the unverified candidate eye area and the size of which depends on the

image. The Examiner submits that Suzuki's eye candidate areas shown in figure 8 are rectangular, centered about the extracted features (i.e. unverified candidate eye areas), contain the neighborhood around the features and their size, because the size of the features depends directly on the size of the image, also depends on the image. As correctly pointed out by Applicant's Representative, Suzuki determines these regions by the use of histograms. However, the claim only requires that they are determined to meet the above requirements. Clearly, Suzuki does teach such neighborhood regions.

b. Applicant's Representative submits that Ando also fails to teach the aforementioned limitations. However, as discussed, Suzuki does teach the determination of neighborhood regions based on unverified candidate eye areas as claimed, such that Ando does not need to also teach it. Applicant's Representative further submits that Ando does not disclose the use the ratio of the number of black regions within the neighborhood region to the size of the neighborhood region recited in the claims. Instead, Applicant's Representative submits, Ando only evaluates the dimensions of black regions and compares them to dimensions of human eyes to determine if the black region is a pupil. As noted in the previous Office Action, and as correctly noted by Applicant's Representative, Ando teaches detecting pupils by looking for black regions having dimensions expected for a human eye. Specifically, after a region S_d has been determined, the number of black pixels, BPN, in the region is counted for reach horizontal line. The maximum detected number of black pixels is saved in

a maximum black pixel number register, MXL. The vertical width of the region (i.e. height) is also calculated and stored in a vertical width register, W. Finally, a check is done to determine whether the ratio MXL / W is equal to or less than a predetermined value. If the condition is satisfied, the pupil is regarded as being detected (See Col. 19 in Suzuki). As previously indicated, the region's height is reasonably regarded as *a size* of the neighborhood region and the dark pixels counted by Ando as the dark areas to be detected and counted. Furthermore, Ando's teaching of detecting and counting all the dark pixels, but only storing the maximum number of dark pixels per line, satisfies the claim limitation requiring detecting dark areas (pixels) in the region, counting the number of them and recording it.

In view of this reasonable interpretation of the claims and the prior art, the Examiner *respectfully* submits that Suzuki and Ando do teach determining a neighborhood region as in step 'c)' and using the ratio of number of dark regions to size of the neighborhood region to determine whether an unverified candidate eye are is a true eye area. Therefore, the standing 35 U.S.C. 103 rejections set forth below are believed to be proper.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. Claim 2 recites the limitation "said judged candidate eye area" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 101

8. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

9. Claims 1, 2, 5 and 8 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. Supreme Court precedent[1] and recent Federal Circuit decisions[2] indicate that a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. While the instant claim(s) recite a series of steps or acts to be performed, the claim(s) neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. For example, the claims should positively tie the inventive method steps by explicitly reciting a limitation such as "using a computer to

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[1] *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

[2] *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

perform the steps of:" in the body of the claim (supported, at least, by page 7 of the original specification). Any amendment to the claims should be commensurate with its corresponding disclosure.

Claim Rejections - 35 USC § 103

10. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

11. Claims 1, 2, 5, 8, 10, 11 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki (U.S. Patent No. 5,859,921) in view of Ando (U.S. Patent No. 5,008,946). Hereinafter referred to as Suzuki and Ando respectively.

a. Regarding claims 1, 10 and 19, Suzuki teaches a human eye detection method and apparatus for detecting a human eye by determining whether an unverified eye area is a true eye area based on a neighborhood region of the unverified candidate eye area, comprising: an input unit that inputs an image **(Suzuki Fig. 1 – element 1 and Fig. 2 – step 1)**; and a processor **(Suzuki Fig. 1 element b)** that (i) analyzes the image to obtain the unverified candidate eye area **(Suzuki Col. 19 lines 65 – 67) [Note that the characteristic feature areas of the face are candidate eye areas that may or may not correspond to true eyes]**; (ii) determines the neighborhood region in the image of the candidate eye area, the region based on the unverified candidate eye, the neighborhood region being defined as a rectangle, the center of which is the center of the unverified candidate eye area and the size of which depends on the image**(Suzuki Col. 20**

lines 3 – 49) [Note that the resulting rectangular 'eye candidate areas' are the neighborhood regions, which neighbor and are centered about each characteristic feature – see Fig. 8.]. Suzuki goes on to teach an eye area function (EFV) to validate the candidate eye regions **(Suzuki Col. 21 lines 26 – 34)**, and using the output to judge whether or not the candidate area is a real eye area. However, **Suzuki fails to teach** an eye-evaluation process which (iii) calculates neighborhood the region's size S, (iv) detects dark areas in the neighborhood region and determines the total count N of dark areas in the neighborhood region, (v) and determines whether or not the unverified candidate eye area is a true eye area by comparing the ratio N/S to a predetermined first threshold, wherein if the ration N/S is smaller than the first threshold, the unverified candidate eye area is determined to be a true eye area, else the unverified candidate eye area is determined to be a false eye area. **Pertaining to the same field of endeavor, Ando teaches a pupil detection system in which the validity of a detected pupil regions are determined by looking for black regions having the dimensions expected for a human eye. Specifically, after a region around a dark area S_d has been determined, the number of black pixels, BPN, in the region is counted for each horizontal line (Ando Col. 19 lines 5 – 11). The maximum detected number of black pixels is saved in a maximum black pixel number register, MXL (Ando Col. 19 lines 36 – 41). The vertical width of the region (i.e. height) is also calculated and stored in a vertical width register, W (Ando Col. 19 lines 51 –**

53). Finally, a check is done to determine whether the ratio MXL/W is equal to or less than a predetermined value. If the condition is satisfied, the pupil is regarded as being detected (Ando Col. 19 lines 59 – 64). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Suzuki by replacing the eye evaluation function, EFV, generating step with the valid pupil detection method taught by Ando, and to use Ando's dark-pixel-counting detection method to judge whether or not each of Suzuki's characteristic feature areas contains a pupil and thus corresponds to a valid/real eye area. Such a modification would eliminate the need to evaluate the product of two auxiliary functions, EFV1 and EFV2 (Suzuki Fig. 9 step 609) thus resulting in a simplified eye-region verification process.

- Regarding claim 19, Suzuki is silent as to whether the implementation of the aforementioned steps is as program code or discrete logic elements; however, Ando teaches the implementation of the eye detection method using a microprocessor with corresponding ROM and RAM **(Ando Fig. 1 elements 8,9 and 10) [See also Col. 7 lines 27 – 30]**. Such microprocessors clearly rely on coded instructions to perform the desired operations. **Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to realize the steps taught by Suzuki and Ando by way of processor-executable program code in order to reduce cost and speed development**

by eliminating multiple discrete components as well as exploiting the flexibility of a programmable device.

b. Regarding claim 2, Suzuki in view of Ando teach all the limitations of the independent claim 1 as set forth in the 103 rejection of claim 1 above. **Suzuki also teaches** determining candidate face areas on the basis of said judged candidate eye area obtained from said step f **(Suzuki Col. 7 lines 33 – 40)**.

c. Regarding claims 5 and 11, Suzuki in view of Ando teach all the limitations of the independent claims 1 and 10 and dependent claim 2 respectively as set forth in the 103 rejection of claims 1, 2 and 10 above. **Suzuki also teaches** correctly obtaining characteristic features of a face image by converting it into a binary image **(Suzuki Col. 3 lines 25 – 28)**. In the pupil detection method taught by Ando used to modify Suzuki, **Ando also teaches** that the region surrounding the eye, 'S_d' is also binarized using a threshold value so as to easily separate regions whose grey levels change rapidly (i.e. potential eyes) from the background within the region **(Ando Col. 4 lines 33 – 42)**. **Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to binarize both the entire image and the candidate eye regions by thresholding their grey scale values in order to easily differentiate dark regions (potential eye regions) from background regions while avoiding the need for additional/redundant processing steps for each.**

d. Regarding claim 8, Suzuki in view of Ando teach all the limitations of the independent claim 1 and the dependent claim 2 as set forth in the 103 rejection of claims 1 and 2 above. In the pupil-detection method used to modify Suzuki, **Ando also teaches** as part of the method, a threshold or comparison value, K, calculating step prior to the ratio comparison **(Ando Col. 20 lines 59 – 63)**. **Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a variable threshold or comparison value calculation so as to optimize the pupil detection criteria based on individual input image.**

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL A. NEWMAN whose telephone number is (571) 270-3016. The examiner can normally be reached on Mon - Thurs from 9:30am to 6:30pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew C. Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew C Bella/
Supervisory Patent Examiner, Art Unit 2624

M.A.N.